REMARKS

Claims 1, 2, 6, 7, 12, 13, 17, 18, 23, 24, 28, 29, and 34-57 are pending. Claims 58-60 are new. Based on the foregoing amendments and following remarks, reconsideration and allowance of this application is respectfully requested.

Claim Objections

The Office Action has objected to claims 6, 17, 28, 40-41, 47, 49, and 56-57 on the basis of informalities.

The Examiner is thanked for pointing out the claim dependency problems associated with claims 6, 17, and 28 based upon cancellation of claims. Claims 6, 17, and 28 have been amended to correct the identified dependency problems.

Objections has been raised to claims 6, 17, and 28 based upon the phrases "a predicted effect" and "one or more parameters". The claims have been amended to remove the phrase "a predicted effect". Support for the phrase "one or more parameters" can be found in the specification, for example, at paragraphs 0020, 0021, and 0025. Applicant respectfully submits that the claims comply with specified requirements.

Objections has been raised to claims 40-41, 47, 49, and 56-57 on the basis of the claimed phrases "examining effects of the clock element modification and placement locations as a mixed programming problem." Applicant notes that support for this phrase can be found in the specification, for example, at paragraphs 0027 and 0028. Applicant respectfully submits that the claims comply with specified requirements.

Claim Rejections - 35 U.S.C. §112

Claims 1, 12, and 23 have been rejected under 35 U.S.C. §102 as failing to comply with the written description requirement. Applicants respectfully disagree.

The specification contains extensive description of the action of automatically modifying the number of clocked elements in one or more pipeline locations. For example, at least the following paragraphs support the claim element: 0016-0028 and 0030-000036.

As amended, claims 1, 12, and 23 also include limitations, clearly described and supported in the specification, which are employed to automatically modify the number of clocked elements in one or more pipeline locations.

For at least these reasons, Applicant respectfully submits that claims 1, 12, and 23 comply with the requirements of 35 U.S.C. §112.

Claim Rejections-35 U.S.C. §103

Smits

Claims 1-2, 12-13, 23-24, 34-38, 42-45, and 50-54 stand rejected under 35 U.S.C. §103, as being obvious over U.S. Patent No. 6,631,444 to Smits et al. ("Smits"). Applicant respectfully traverses the rejection. Applicant notes that Smits is a §102(e) prior art reference, and the present Remarks are being made without prejudice to antedate this reference should it be necessary.

Claim 1 recites the following limitations:

    generating an electronic design;
    specifying one or more pipeline locations of the electronic design;

determining whether to insert one or more clocked elements at the one or more pipeline locations where it is possible to insert the clocked element, where a determination can be made to avoid pipelining for at least one of the one or more pipeline locations; and

based upon results of determining whether to insert the one or more clocked elements, automatically modifying a number of clocked elements in the one or more pipeline locations of the design.

Applicant notes that a 103 rejection can be maintained only if each and every limitation of the pending claim is taught or suggested by the combination of the cited references. Here, at least one or more of the above limitations of claim 1 are not taught or suggested by the cited reference(s).

For example, Smits fails to teach or suggest the action of "determining whether to insert one or more clocked elements at the one or more pipeline locations where it is possible to insert the clocked element, *where a determination can be made to avoid pipelining for at least one of the one or more pipeline locations*" as is presently claimed. In particular, Smits fails to teach or suggest the explicit act of determining whether or not to insert one or more clocked elements, and further fails to teach or suggest that based upon this determination, pipelining is avoided for at least one of the one or more pipeline locations.

As noted in the Specification of the instant application at paragraph 0017, there are circumstances for which it is not desirable to implement pipelining, even after possible locations have been identified for the pipelining. For example, avoiding pipelining may be a default mode of operation for one or more signals, and may remain true where the highest performance is needed.

There is no teaching or suggestion in Smits of this limitation. As noted by the Examiner, Smits is directed to an implementation of a memory bank in which flip-flops may be inserted into a design in a data path. However, Smits does not disclose the specific act of identifying one or more pipeline locations, where pipelining is avoided for at least one of the pipeline locations after the identification of those locations. Applicant notes that it is logical that these limitations are not

disclosed, since Smits merely describes the end result of inserting flip-flops into a memory bank

design and not the specific steps of a process for doing so. This is clear from the figures of Smits, in

which only architectural figures of the improved memory bank design are shown, and no flowchart

figures are provided that describe process actions on *how* and *when* to implement the flip-flops.

As such, Smits fails to teach or disclose any process for determining the impact of

pipelining, and based upon determining the impact of pipelining, determining whether or not to

insert clocked elements. In particular, Smits does not disclose any steps of such a process in which a

determination is made to NOT include a flip-flop, nor any rationale for why such a step would be

needed in the Smits disclosure.

Moreover, claim 1 also recited the limitation "automatically modifying a number of clocked

elements in the one or more pipeline locations of the design..." Smits fails to disclose or teach this

limitation.

The Office Action at page 4 states that this would be obvious from Smits since "automation

method is known to be more convenient routine practice and fast. Therefore, it would be have been

obvious to practitioners that the insertion of number of clocked elements in the interconnect

pipelining (modifying number of inserted clocked elements) as taught by Smits et al. would have

been done automatically because it is more convenient and fast, thereby it would provide

synchronization and latency." Applicant respectfully disagrees.

Although Smits discloses inserting clocked elements into pipelined locations of a circuit

design, such clocked element insertion is not disclosed as being performed automatically. In fact,

because Smits inserts such clocked elements into a cache memory architecture, there is no

motivation or apparent benefit to automate the Smits clocked element insertion methodology. That

is, cache memory architectures are relatively simple circuits composed of large arrays of repetitions

of simple elements. Because they are simple, regular, and of limited function, the effects of clocked element insertion is easy to predict, and thus all aspects of the clocked element insertion can be manually accomplished relatively easily. Also, the clocked elements must be inserted into the cache memory architecture in a very regular pattern, and thus, only a few such patterns are available to the designer.

In contrast, the inventors were posed with the problem of inserting clocked elements within a general circuit architecture where the effects of clocked element insertion are not easily predicted. For example, some clocked elements will not help at all, some will help a lot, and some will not help unless others are changed as well. It is difficult to determine the number of clocked elements to be inserted at pipelined locations without adversely affecting circuit functionality. There are many different possibilities (perhaps 10s of millions) as opposed to the very few that are available in a memory cache architecture. With a cache memory architecture, a designer could very reasonably look at all possible solutions, whereas for arbitrary logic, such as that found in general circuit architectures, manual clocked element insertion is very intensive. Thus, the efficient and effective insertion of clock elements into a general circuit architecture presents a much more difficult problem than that presented by the memory cache disclosed in Smits, and one that has not yet been solved satisfactorily, as discussed in paragraphs [0004]-[0007] of the current application.

Moreover, Applicant notes that Smits does not teach in any way *how* to automate the process of inserting clocked elements as presently claimed in claim 1. Even if there is some motivation to automate insertion of flip-flops into a memory bank, for which Applicants strenuously disagrees, Smits fails to teach or describe the steps that would enable one skilled in the art to perform such motivation.

The Office Action cites to *In re Venner*, 120 USPQ 192 for the proposition that "automatic means to replace manual activity which has accomplished the same result involves only routine skill in the art." Applicant respectfully notes that *In re Venner* did not state that automatic means are never patentable over the prior manual approach or that if the same result is reached then it only involves routine skill. In *In re Venner*, the Applicants were attempting to patent a molding apparatus controlled by a automatically actuating valve system. In this decision, the CCPA was merely stating that the specific improvement being claimed was not patentable as being obvious over the prior art since it only "broadly provides" a mechanical or automatic means to replace a manual activity, and the means being provided was obvious to one skilled in the art. The circumstance of *In re Venner* is distinguishable from the instant claimed invention, since the pending claims are directed to a complex general problem of being able to automatically insert clocked elements within a general circuit architecture. As noted above, where the effects of clocked element insertion are not easily predicted, some clocked elements will not help at all, some will help a lot, and some will not help unless others are changed as well. Because of these problems that must be overcome to implement the presently claimed automated approach, clearly there is involvement of more than just routine skill in the art.

Applicant further notes that *In re Venner* cites to *In re Rundell,* 18 CCPA 1290, 48 F.2d 958, 9 USPQ 220 for the above-stated proposition regarding manual versus automatic means. Applicant has carefully studied *In re Rundell* and note that this decision is only stating that "the mere statement that a device is to be operated automatically instead of by hand, without a claim specifying any particular automatic mechanism, is not the statement of an invention." *In re Rundell* does NOT state that automated means are not patentable over prior mechanical means nor that automatic

means to replace manual activity which has accomplished the same result involves only routine skill in the art.

In sum, Smits does not disclose the claimed automated modification of a number of clocked elements at one or more specified pipelined locations, and there is no suggestion in Smits to do so.

Applicant further notes that it is improper to use hindsight analysis and the motivation of Applicant's own invention to render the claimed invention obvious. Such motivation is not described anywhere in Smits, and the Office action has failed to cite any specific portion of Smits which contains such motivation.

For at least the above reasons, Applicant respectfully submits that independent claim 1 is not obvious over Smits. For at least the same reasons, claims 12 and 23 are likewise not obvious over Smits. Any claims that depend from claims 1, 12, and 23 (2, 6, 7, 13, 17, 18, 24, 28, 29, and 34-57) are also not obvious over Smits.

Smits and Yoshikawa

Claims 6-7, 17-18, 28-29, 39-41, 46-49, and 55-57 stand rejected under 35 U.S.C. §103, as being obvious over Smits in view of U.S. Patent No. 6,466,066 to Yoshikawa et al. ("Yoshikawa"). For at least the same reasons as presented above for claims 1, 12, and 23, Applicant respectfully submit that dependent claims 6-7, 17-18, 28-29, 39-41, 46-49, and 55-57 are not obvious over the cited references.

New Claims

Applicant submits that newly added claims 58-60 find support in the specification, as originally filed, and are patentable over the cited prior art for at least the same reason as independent claims 1, 12, and 23 from which they depend.

CONCLUSION

If the Examiner has any questions or comments, please contact the undersigned at the number listed below.

The Commissioner is authorized to charge any fees due in connection with the filing of this document to Bingham McCutchen's Deposit Account No. **50-2518,** referencing billing number **7016672001**. The Commissioner is authorized to credit any overpayment or to charge any underpayment to Bingham McCutchen's Deposit Account No. **50-2518,** referencing billing number **7016672001**.

Respectfully submitted,

Bingham McCutchen LLP

Dated: 2/27/06

By: _____
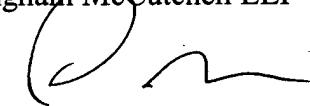
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